I. Objection Under 37 U.S.C. § 1.84(p)(5)

The drawings were objected to by the Examiner under 37 U.S.C. § 1.84(p)(5). The Examiner indicated that the drawings do not include the following reference sign(s) mentioned in the description: 'arrow 12' [0025], FIG. 14 and Fig. 4 [0029]. In the response to the objection by the Examiner under 37 U.S.C. § 1.84(p)(5), the Applicants have amended the specification to correct the use of reference numeral "22" with the word "arrow." The correct phrase should be "arrow 22." Also, note that a Fig. 14 is not present in the disclosed specification. The use of the term "Fig. 14" was a minor error. The correct phrase should have been "Fig. 4". Paragraphs 0025 and 0029 have thus been amended accordingly.

The Applicants thus believe that the amendments to the specification as indicated herein now overcome the objection by the Examiner under 37 U.S.C. § 1.84(p)(5). Thus, a proposed drawing correction is not required due to the nature of the amendments to the specification indicated herein. It is believed that such amendments to the specification do not constitute new matter, but is merely clarifying in nature in order to overcome the objection by the Examiner.

II. Rejection Under 35 U.S.C. § 112

Claim 2 was rejected by the Examiner under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly clam the subject matter which the Applicants regards as the invention. The Examiner stated that Claim 18 recites "a common mode filter apparatus...comprising" yet only recites method steps. The Examiner therefore concluded that it is not clear whether the claim is intended to be a product claim or a process claim.

The Applicants have thus amended claim 18 to correct these inconsistencies. It is believed that claim 18 as amended herein now overcomes the Examiner's rejection under 35 U.S.C. § 112.

II. Rejection Under 35 U.S.C. § 102(e)

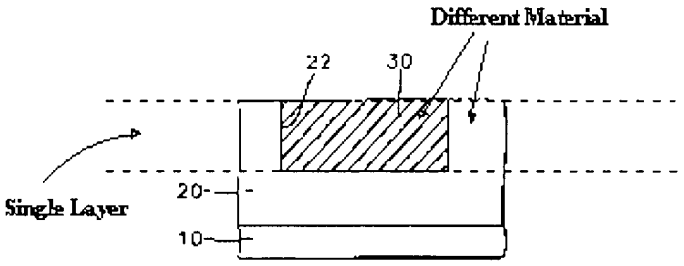
The Examiner rejected claims 1, 8-9 and 11-12 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,417,088 to Ho et al.

Regarding claim 1, the Examiner stated that Ho et al discloses a method for forming a wiring bond pad utilized in wire bonding operations on an integrated circuit device comprising the steps of: configuring a wiring bond pad 30, fig. 1, to comprise a single metal later, and positioning at least one integrated circuit device 10 below the wiring bond pad to thereby conserve integrated circuit space and improve wiring bond pad efficiency as a result of configuring the wiring bond pad as a single metal layer wiring bond. The Applicants respectfully disagree with this assessment.

As indicated at col. 3, lines 9-12, of Ho et al, FIG. 1 shows "a schematic cross-sectional diagram of metal bonding pad 30 **within** opening 22 of intermetal dielectric layer 20 of an integrated circuit that includes semiconductor structure 10." Additionally, as indicated at col. 3, lines 22-23, "bonding pad opening 22 is etched **within** IMD layer 20," and "metal bonding pad 30 is formed **within** bonding pad opening 22." It is clear from the foregoing description and a viewing of FIG. 1 that bonding pad 30 described by Ho et al is not a **single metal layer**. Instead, bonding pad 30 forms part of a layer that is shared partially with intermetal dielectric layer 20. Ho et al describes bonding pad 30 as specifically constituting a "recessing copper bonding pad 30" as indicated at col. 3, line 46. The term "recesses" thus clearly does not anticipate a "single metal layer" but instead a

material, which is recessed within a portion of a layer shared by other material (i.e., the section 20 of Hot et al).

A copy of FIG. 1 of Ho et al is provided below. Applicants have added dashed lines to indicate that the area between the dashed lines is a single layer and that this layer is shared by different material, i.e., both a portion of layer 20 and bonding pad 30, rather than forming a single metal layer.



Thus, the bonding pad 30 shown in FIG. 1 of Ho et al does not a comprise a single metal layer but instead forms a layer shared by several types of materials, including a portion of intermetal dielectric layer 20 and bonding pad 30, not a **single metal layer**. The Applicants thus believe that the configuration of FIG. 1 of Ho et al cited by the Examiner does not teach, anticipate or suggest a bonding pad formed as a single metal layer and that the rejection to claim 1 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,417,088 to Ho et al should be withdrawn.

Regarding claims 8 and 11, the Examiner stated that Ho et al discloses a method for forming a wiring bond pad wherein the single metal layer 30 comprises a copper layer (i.e., column 3, line 28 of Ho) having a thickness of approximately 10KÅ (i.e., citing column 3, line 47 of Ho et al). The Applicants disagree with this assessment. As indicated above, the

bonding pad 30 of Ho et al does not constitute a single metal layer, but rather a layer that is shared by other material. Thus, it is improper to refer to bonding pad 30 of Ho et al as a "single metal layer 30". The fact that Ho et al describes a "the recessed copper bonding bad structure 30 is recessed 44 from about 1000 to 10,000 Å, and more preferably from about 2000 to 7000 Å beneath the surface 40 of patterned passivation layer 40" is irrelevant considering that the bonding pad structure 30 of Ho et al is a recessed structure and the bonding pad taught by Applicants' invention is not.

The bonding bad taught by Applicants' invention comprises a "single metal layer," which is a different structure altogether than the recessed structure taught by Ho et al. Additionally, Applicants' claim 1 provides a structure which "conserves integrated circuit space and improves wiring bond pad efficiency as a result of configuring the wiring bond pad as a single metal layer." The recessed structure taught by Ho et al does not conserve integrated circuit space and does not improve wiring bond bad efficiency. The Applicants thus believe that the configuration of FIG. 1 of Ho et al cited by the Examiner does not teach, anticipate or suggest a bonding pad formed as a single metal layer and that the rejection to claims 8 and 11 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,417,088 to Ho et al should be withdrawn.

Regarding claim 9, the Examiner stated that Ho et al discloses a method for forming a wiring bond pad further comprising the step of forming a layer of aluminum film 52 (i.e., citing column 4, line 1 of Ho et al), above single metal layer 30. Because claim 9 incorporates all of the features of claim 1, claim 9 also claims the step of forming or configuring a bonding pad as a single metal layer (i.e., a bonding pad comprising a single metal layer). The aluminum film 52 of Ho et al is not formed above a single metal layer. Instead, the aluminum film 52 of Ho et al is formed above a layer composed of different materials, not a single metal, as described above. The Applicants thus believe that the configuration of FIG. 1 of Ho et al cited by the Examiner does not teach, anticipate or

suggest a bonding pad formed as a single metal layer and that the rejection to claim 9 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,417,088 to Ho et al should be withdrawn.

Regarding claim 12, the Examiner stated that Ho et al discloses a method for forming a wiring bond pad wherein the layer of aluminum film 52 above the single metal layer comprises a buffer 52 and bonding layer 60. The Applicants disagree with this assessment. The buffer and bonding Applicants claim 12 indicates that the layer of aluminum film above the single metal layer comprises a buffer and bonding layer. Thus, the aluminum film comprises a layer that functions as both a buffer layer and a bonding layer. The Examiner cites two different layers – i.e., a buffer 52 and a layer 60 of Ho et al. These thus comprise two different layers, not one buffer and bonding layer composed of aluminum. Additionally, claim 12 incorporates all of the features of claim 1. As explained earlier, Ho et al does not teach, suggest or anticipate a single metal layer, which forms a bond pad. Thus, the film 52 of Ho et al is not disposed above a single metal layer, but rather a recessed portion, which shares other material within the same layer, rather than a single metal layer.

The Applicants thus believe that the configuration of FIG. 1 of Ho et al cited by the Examiner does not teach, anticipate or suggest a bonding pad formed as a single metal layer and that the rejection to claim 12 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,417,088 to Ho et al should be withdrawn. The Applicants thus request that the rejections to claims 1, 8-9 and 11-12 under 35 U.S.C. § 102(e) should be withdrawn. The Applicants also believe that the aforementioned arguments against the rejections under 35 U.S.C. § 102(e) by the Examiner apply equally to the Examiner's rejections under 35 U.S.C. § 103.

III. Rejections Under 35 U.S.C. § 103(a)

Claims 3-7 and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ho et al (U.S. Patent No. 6,417,088) in view of Zhao (U.S. Patent No. 6,198,170). This rejection is respectfully traversed as discussed herein.

Regarding claim 3, 4 and 6, the Examiner stated that Ho discloses a method for forming a wiring bond pad wherein the single metal layer is located above a single inter-metal dielectric (IMD) layer 20 further comprising the step of locating at least one integrated circuit device 10 below the IMD layer.

The Examiner admitted that Ho does not expressly disclose the single metal layer 30 located above a plurality of IMD layers. The Examiner stated, however, that Zhao discloses a single metal layer located above a plurality of IMD layers (low-k dielectric material) 422, 420, 418, 416 and 414 (referencing Fig. 4, column 14, lines 25-45) and that the fabrication process can be repeated (referencing column 10, lines 30-22). The Examiner thus concluded that at the time the invention was made, it would have been obvious to one of ordinary skill in the art to have combined the plurality of IMD layers of Zhao with the bonding pad of Ho, because it would have increased the thermal conductivity and bonding pad, thereby resulting in a stronger electrical connection between bond wires and bonding pad (i.e., referencing Zhao, column 15 line 1-6).

The Applicants respectfully disagree with this assessment. As indicated earlier in this Response, Ho does not teach, anticipate, or suggest a wiring bond pad formed from a "single metal layer." Instead, as indicated earlier, Ho teaches a layer shared by several types of materials, including a portion of intermetal dielectric layer 20 and bonding pad 30, not a "single" metal layer. Thus, it would be improper to combine Ho with Zhao to suggest that such references teach the single metal layer taught by Applicants' invention. Additionally,

Zhao does not teach IMD layers. Instead, Zhao teaches dielectric fillers of low-k dielectric material 422, 420, 418, 416 and 414 at Fig. 4, column 14, lines 30-22. Such layers are not IMD layers. Such dielectric fillers also do not teach, suggest or anticipate specific IMD layers 1 to 7 as taught by Applicants' claim 6. Thus, the rejection to claim 3, 4 and 6 should be withdrawn.

Regarding claims 5 and 7, the Examiner stated that Ho discloses a method for forming a wiring bond pad, wherein the single metal layer 30 comprises a copper layer. The Examiner cited column 3, line 28 in support of this assertion. Applicants again dispute this analysis because Ho does not teach a single metal layer. Instead, as indicated earlier, Ho teaches a layer shared by several types of materials, including a portion of intermetal dielectric layer 20 and bonding pad 30, not a "single" metal layer. Thus, the rejections to claims 5 and 7 should be withdrawn.

Regarding claim 10, the Examiner stated that Ho does not expressly disclose the aluminum (Al) film 30 having a thickness in the range of 10KÅ to 20 KÅ. The Examiner qualified this statement, however, by stating that Ho discloses a method for forming a wiring bond pad wherein the layer of Al film 30 forms above a single metal layer having a thickness in the range of 5,000Å. In support of this assertion, the Examiner cited column 4, line 35. The Examiner thus concluded that it would have been obvious to use the Al thickness teaching of Ho in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation.

The Applicants' disagree with this assessment. In order to establish "obviousness", three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a

reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art. The Examiner has not satisfactorily established criteria as a basis for meeting the three factors for prima facie obviousness as indicated above simply because there is a great deal of difference between range of 5,000 Å and a range of 10KÅ to 20 KÅ. One skilled in the art would not have derived a range of 10KÅ to 20 KÅ from a range of 5,000Å, particularly in light of all of the elements of the claims from which claim 10 depends. Thus, the Applicants believe that the rejection to claim 10 should be withdrawn.

II. Conclusion

Applicants have amended claims 1-22 to more particularly disclose the invention claimed thereof. It is believed that such amendments do not constitute new matter, but are rather clarifying in nature. Additionally, it is believed that support for such amendments is provided within the specification, and that the specification adequately enables such amendments. Attached hereto is a marked-up version of the changes made to the claims by the current response, which is captioned "VERSIONS WITH MARKING TO SHOW CHANGES MADE."

In view of the foregoing discussion, Applicants have responded to each and every rejection of the Official Action, and respectfully request that a timely Notice of Allowance be issued. Applicants have clarified the structural distinctions of the present invention by amending the claims. No new subject matter has been introduced as a result of this amendment. Applicants respectfully submit that the foregoing discussion does not present new issues for consideration and that no new search is necessitated. Accordingly, Applicants

respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. § 112, 35 U.S.C. § 103, and 35 U.S.C. § 103, and further examination of the present application.

Applicants have demonstrated that their disclosed and claimed invention is novel and non-obvious relative to the prior art. Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned representative to conduct an interview in an effort to expedite prosecution in connection with the present application.

Respectfully submitted,

Randy Tung
Registration Number 31,311

VERSIONS WITH MARKING TO SHOW CHANGES MADE

IN THE SPECIFICATION

Paragraph 0025 has been amended as follows:

0025 Layer 14 may be configured as a layer of aluminum film possessing a thickness in a range of approximately 10KÅ to 20KÅ. Layer 14 thus functions as a buffer and bonding layer, when positioned above single metal layer 12 (i.e. single layer M8 bond pad). Bonding mechanical stresses are illustrated by arrow 22 ~~12~~, which also indicates the general direction of an associated wiring bond. Additionally, a plurality of intermetal dielectric (IMD) layers 18 is generally illustrated in FIG. 1 to include IMD1 to IMD7 metal layers. A device 20, such as, for example, an integrated circuit device, may be positioned below layers IMD1 to IMD7 to comprise a device under a single layer bond pad.

Paragraph 0029 has been amended as follows:

0029 FIG. 4 depicts a configuration illustrating thicker aluminum bond pad effects, in accordance with a preferred embodiment of the present invention. All of the associated stresses are generally decreased as the aluminum thickness is increased. Thus, by increasing the aluminum thickness, an enhanced buffer layer can be created to protect the "under" IMD layer from damage that may result from ultrasonic motion. In FIG. 4 ~~FIG. 14~~, a configuration 70 is illustrated indicated a control thickness of 12K resulting from the formation of an aluminum buffer layer 72. Such a layer 72 thus possesses a layer thickness of approximately 12KÅ. A copper wiring bond pad 74 is formed from a single copper metal

layer. An aluminum bond pad 76 is also illustrated via configuration 70. Similarly, configuration 71 includes an aluminum bond pad 86 positioned above an aluminum buffer layer 82, which possesses a thickness of approximately 16KÅ. A copper wiring bond pad 84 is also indicated in configuration 71.

IN THE CLAIMS:

Claim 1-22 have been amended as indicated below:

1. (Amended) A method for forming a wiring bond pad utilized in wire bonding operations on an integrated circuit device, said method comprising the steps of:

configuring a wiring bond pad to comprise a single metal layer, wherein said single metal layer does not share said single metal layer with any other material; and

positioning at least one integrated circuit device below said wiring bond pad to thereby conserve integrated circuit space and improve wiring bond pad efficiency as a result of configuring said wiring bond pad to comprise ~~as~~ a single metal layer ~~wiring bond pad~~.

2. (Amended) The method of claim 1 wherein the step of configuring a wiring bond pad to comprise a single metal layer, further comprises the step of:

locating a buffer and bonding layer immediately above said single metal layer ~~configuring said wiring bond pad as a single metal layer wiring bond pad~~.

3. (Amended) he method of claim 1 ~~wherein the step configuring a wiring bond pad to comprise a single metal layer,~~ further ~~comprises~~ comprising the step of:

~~configuring said wiring bond pad to comprise said single metal layer, wherein~~ locating said single metal layer ~~is located~~ above a plurality of intermetal dielectric layers.

4. (Unamended) The method of claim 3 further comprising the step of:

locating said at least one integrated circuit device below said plurality of intermetal dielectric layers.

5. (Unamended) The method of claim 4 wherein said single metal layer comprises a metal-8 layer.

6. (Amended) The method of claim 4 wherein said plurality of intermetal dielectric layers comprises at least IMD-1 to IMD-7 layers.

7. (Amended) The method of claim 5 6 wherein said metal-8 layer comprises a copper layer.

8. (Unamended) The method of claim 1 wherein said single metal layer comprises a copper layer.

9. (Unamended) The method of claim 8 further comprising the step of:

forming a layer of aluminum film above said single metal layer.

10. (Unamended) The method of claim 9 wherein said layer of aluminum film formed above said single metal layer comprises a layer having a thickness in a range of and including 10KÅ to 20KÅ.

11. (Unamended) The method of claim 9 wherein said single metal layer comprises a copper layer having a thickness of approximately 10KÅ.

12. (Unamended) The method of claim 11 wherein said layer of aluminum film above said single metal layer comprises a buffer and bonding layer.

13. (Newly Submitted) A method for forming a wiring bond pad utilized in wire bonding operations on an integrated circuit device, said method comprising the steps of:

configuring a wiring bond pad to comprise a single metal layer, wherein said single metal layer comprises a copper layer;

positioning at least one integrated circuit device below said wiring bond pad to thereby conserve integrated circuit space and improve wiring bond pad efficiency as a result of configuring said wiring bond pad as a single metal layer;

locating said wiring bond pad above a plurality of intermetal dielectric layers, wherein said plurality of intermetal dielectric layers comprises IMD-1 to IMD-7 layers; and

forming a layer of aluminum film above said wiring bond pad, wherein said layer of aluminum film comprises a thickness in a range of and including 10KÅ to 20KÅ.

14. (Newly Submitted) The method of claim 13 wherein said single metal layer of said wiring pond bad comprises a copper layer having a thickness of approximately 10KÅ.

15. (Newly Submitted) The method of claim 13 wherein said layer of aluminum film above said wiring bond pad comprises a buffer layer.

16. (Newly Submitted) The method of claim 13 wherein said layer of aluminum file above said wiring bond pad comprises a bonding layer.